

TECHNOLOGICAL IMPLEMENTATION PLAN

Description of project

EC PROGRAMME:	IST
PROJECT TITLE:	DevelOpment of GRID Environment for InteRaCtive ApplicationS
ACRONYM:	CROSSGRID
PROGRAMME TYPE:	5th FWP (Fifth Framework Programme)
CONTRACT NUMBER:	IST-2001-32243
PROJECT WEB SITE (if any):	http://www.crossgrid.org/main.html
START DATE:	01 Mar 2002
END DATE:	28 Feb 2005
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Commission Officer Name:	Maria Tsakali
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Executive summary

Original research objectives

The Cross Grid project will develop, implement and exploit new Grid components for interactive compute and data intensive applications like simulation and visualisation for surgical procedures, flooding crisis team decision support systems, distributed data analysis in high-energy physics, air pollution combined with weather forecasting. The elaborated methodology, generic application architecture, programming environment, and new Grid services will be validated and tested thoroughly on the Cross Grid test bed, with an emphasis on a user-friendly environment. The work will be done in close collaboration with the Grid Forum and the Data Grid project to profit from their results and experience, and to obtain full interoperability. This will result in the further extension of the Grid across eleven European countries. Objectives: The project objectives are: expanding the Grid for a new category of applications in medicine, environmental control, and physics, running interactively, and extending the Grid infrastructure across eleven European countries. Efficient development of these kinds of applications on the Grid requires new tools for verification of source code, performance prediction, evaluation and on-line analysis. The Grid will be equipped with new components for monitoring of application performance, efficient distributed data access, specific resource management, as well as portals and mobile personalised user interfaces. The new software will be validated and tested on the Cross Grid test bed. Cross Grid will collaborate closely with Data Grid - a common cluster project is planned to obtain full interability. Work description: The work of this project will research, design, develop, implement and test the technology and components essential for the implementation of new tools and services that will allow one to deploy a large range of scientific and engineering applications across a Grid. This is a complex project involving many organizations, software engineers and scientists. It builds upon many national initiatives in this area and as indicated in each of the subsequent work package descriptions, many of the contributing partners are making available considerably more effort to the project than they are requesting EU funding for. They do this to ensure success. The work is split into six work packages: WP1 Cross Grid Application Development; WP2 Grid Application Programming Environments; WP3 New Grid Services and Tools, will each develop specific well-defined parts of different applications and Grid middleware; WP4 International Tested Organization will collect all the developments from the work packages WP1-3 and integrate them into successive software releases. It will also gather and transmit all feedback from the end-to-end application experiments back to the developers, thereby linking development, testing and user experience; WP5 Information and Dissemination and Exploitation; WP6 Project Management, will ensure the active dissemination of the project results and its professional management. Each of the development work packages will start with a user requirements gathering phase, followed by an initial development phase before delivering early prototypes to the tested work package. Following the delivery of these prototypes a testing and refinement phase will continue for each component up to the end of the project. Milestones: Year 2002. First version of medical and flood prediction applications, and first prototypes of new Grid software tested on local clusters. Installation of the national test beds; Year 2003. Deployment of all prototype applications, prototypes of new Grid software and services, on the Grid. Integration of the Cross Grid and Data Grid test beds; Year 2004. Demonstration of the developed Grid infrastructure and software, medical, environmental control, and physics applications. Results on dissemination.

Expected deliverables

The list of CrossGrid deliverables, as mandated by the final version of its Technical Annex, is presented below. D1.0.1 Joint requirements definition document; D1.1.1 Application description, including use cases for Task 1.1; D1.2.1 Application description, including use cases for Task 1.2; D1.3.1 Application description, including use cases for Task 1.3; D1.4.1 Detailed planning for air/sea pollution application including use cases; D2.1 General requirements and detailed planning for programming environment; D3.1 Detailed planning for all the tools and services including use cases for WP3;

D4.1 Detailed Planning for Testbed Setup; D5.1.1 –D5.1.12 Quarterly reports; D5.2.1 Quality assurance plan; D5.2.2 The CrossGrid architecture requirements and the first definition of the architecture; D5.3.1 CrossGrid Web page; D1.0.2 Semi-annual managerial report for WP1; D2.2 WP2 internal progress report; D3.2 WP3 internal progress report; D4.2 First testbed set-up on selected sites; D5.2.3 Full description of the CrossGrid standard operational procedures and specification of the structure of deliverables; D5.3.2 Dissemination and exploitation plan; D5.3.3 – D5.3.7 Public (industrial) presentations; D4.3 WP4 status internal report; D5.3.8 CrossGrid Website; D4.4 1st Testbed prototype release; D5.3.9 – D5.3.11 Project leaflet / brochure; D5.3.12 – D5.3.14 Dissemination and exploitation report; D5.3.15 – D5.3.17 Yearly collaboration meeting; D1.0.3 Extended yearly managerial report for WP1; D1.1.2a D1.1.2b Internal progress report First internal software release; D1.2.2a D1.2.2b Internal progress report First internal software release; D1.3.2a D1.3.2b Internal progress report First internal software release; D1.4.2 Results of migration of data mining algorithms to GRID structure; D2.3 Demonstration and report on WP2 1st prototypes; D3.3 1st prototype – first WP3 software release for health and HEP applications build on local grid infrastructure; D5.1.13 –D5.1.15 Yearly reports; D5.2.4 Report on requirements for integration and interoperability with DataGrid; D2.4 Internal progress report on WP2 software evaluation and testing; D3.4 Internal progress report on WP2 software evaluation and testing; D4.5 WP4 status internal report; D5.2.5 Detailed report on the CrossGrid architecture; D1.3 Report on application prototype 0 run; D5.3.13 Dissemination and exploitation report; D1.4 Internal progress report Second internal SW release; D2.5 Demonstration and report on WP2 2nd prototypes; D3.5 Report on the results of the WP3 2nd prototype; D4.6 WP4 status internal report update; D5.2.6 Current CrossGrid architecture assessment report; D5.2.7 Final CrossGrid architecture and interoperability requirements description; D5.3.14 Dissemination and exploitation report; D1.7 Report on final application demonstration; D2.7 Demonstration and documentation on the final versions and testing of all WP2 software components; D3.7 WP3 final report; D4.9 WP4 final demo and report; D5.2.8 Technology implementation plan; D5.1.16 Final report.

Project's actual outcome

Interactive simulation and visualization in a biomedical system: This is a Grid-based problem-solving environment (PSE) for virtual vascular surgery, using a set of hardware and software resources available via the CrossGrid infrastructure for building a specific framework to support vascular surgeons. Flooding crisis team support system: The flood forecasting application framework with appropriate simulation models enable users to easily run desired sequence of simulations and respective post-processing tools, browse the results of simulations, register results and applicable metadata into the metadata catalogue for later search and retrieval. Distributed data analysis in High Energy Physics: This task developed two parallel analysis applications for High Energy Physics: ANN, an interactive neural network training application to be used in search for new physics; and SLEUTH, an application to search for Higgs boson, supersymmetric particles and exotics physics in the CMS experiment. Weather forecasting and air pollution modeling: This task has developed a representative collection of Grid applications for use by the atmospheric/oceanographic community. The MARMOT MPI verification tool: MARMOT is an MPI application development tool that checks automatically at run-time whether an application conforms to the MPI-standard and uses e.g. MPI resources such as communicators, groups or data types in a correct way. The PPC Performance prediction component: The PPC tool provides performance information about some selected computational kernels when they are executed on the Grid. The predicted data are based on analytical models obtained from exhaustive monitored measurements. The G-PM monitoring tool: G-PM is a performance evaluation tool for interactive Grid applications. It can be used by program developers as well as knowledgeable program users to investigate the performance of applications, especially, to help in discovering performance bottlenecks. The CrossGrid Portal: The Portal that was developed in the context of the CrossGrid project had as primary goal the provision of a user-friendly web-based interface, through which the potential user would be able to submit jobs to the Grid. Migrating Desktop and Roaming Access Server The Migrating Desktop is a ready-to-use GUI framework for accessing the Grid resources in a uniform way, giving a transparent user work environment, independent of the system version and hardware. The Roaming Access Server is an underlying layer that mediates between the Migrating Desktop and grid resources. Gridbench: GridBench is a tool for evaluating the performance of Grids and Grid resources through benchmarking. It facilitates easy definition of parameterized execution of benchmarks on the Grid, while at the same time allowing for archival and retrieval of results and the creation of customized charts from these results. SANTA-G: The SANTA-G NetTracer is a demonstrator of the SANTA-G framework. SANTA-G is a generic framework that was developed to support information sources that generate a large amount of data at a very fast rate in a form unsuitable for direct insertion to a Grid monitoring system. The JIMS service: JIMS - the JMX-based Infrastructure Monitoring System - is a result of three years of development during the CrossGrid project. It is a Grid monitoring tool with interoperable Web Service API (Application Programming Interface) and Java command line clients. The CrossGrid scheduler: The scheduler, developed in collaboration with the DataGrid project, enables assigning job to the respective computing resources with the aid of a job description metafile. The OCM-G monitoring service: The OCM-G (OMIS-Compliant Monitoring system for the Grid) is a system for monitoring of parallel applications running on the Grid. The OCM-G provides services for collecting and preprocessing information about applications at runtime. The Grid Visualization Kernel - GVK: GVK aims at exploiting the power of the Grid to provide visualization services to the scientific user. Large amounts of data involved in such visualization process require optimized network transmission in order to achieve the required performance goals and minimize latency for interactive applications. Data Access Optimization - UDAL: The Unified Data Access Layer (UDAL) provided by task 3.4 of the CrossGrid project, provides a flexible architecture for storage nodes and storage centers. UDAL allows for a very flexible optimization and control of the internal behavior access to data stored in heterogeneous devices. International Testbed Organization: One of the principal aims of CrossGrid has been to create a pan-European testbed for developers of Grid applications, paving the way for further deployment and cooperation in a Grid environment, even after the Project concludes.

Broad dissemination and use intentions for the expected outputs

Exploitation plans for individual CrossGrid components are detailed below. Detailed plans can be found in a separate section of this TIP. Interactive simulation and visualization in a biomedical system: To ensure good user experience, a unique desktop Virtual Reality system (a Personal Space Station) will be built, which will serve as the interaction-visualization front-end for the user manipulations over the Grid. End-users can interact with the system via a multi-modal interface, which combines natural input modes of context sensitive interaction by voice, hand gestures and direct manipulation of virtual 3D objects. Flooding crisis team support system: The flood application will be transferred to the EGEE project testbed and will be enhanced in such a way as to be useful for real users within the ESR VO (earth science research virtual organization). Distributed data analysis in High Energy Physics: The analysis applications are foreseen to be used in the future CMS experiment at LHC. The network studies would need to continue access to the CrossGrid testbeds and close collaboration with GEANT and NREN operators. These studies may become a base for research for massive long-haul transfers in real time for other sciences. Weather forecasting and air pollution modelling: Implementation of WAM model with COAMPS input: partner institutions (e.g. the Maritime Institute in Gdansk) running operational wave models will introduce high resolution COAMPS forecast to their operational practice. The MARMOT MPI verification tool: In 2005, we formed a consortium with ZHR (TU Dresden), GWT, GNS mbH, SCAI Fraunhofer. The goal of the "PERFECT" project is the development of a software environment integrating existing tools such as Vampir or MARMOT. The proposal was submitted to the German Federal Ministry of Education and Research. Universität Stuttgart has also agreed with Intel on a research project funded by the Intel Advanced Computing Center. The PPC Performance prediction component: Currently we are completing the research with new functionalities and kernels, not previewed in the project. The final objective is to present the whole tool in a Ph.D. thesis next year. The tool will be used in our Ph.D. courses as a tool for practical exercises. The G-PM monitoring tool: Developing automatic performance analysis systems - the research results will be integrated into future automatic performance analysis systems in cooperation with the University of Siegen. The CrossGrid Portal: The Grid Portal toolkit that was developed in the context of the CrossGrid project will be further developed, partly in collaboration with other partners. Some parts of it will be used in other Grid-related projects, such as MEDIGRID. Migrating Desktop and Roaming Access Server: MD is slated for further development and exploitation in the emerging BalticGrid project which will extend Grid infrastructure to the Baltic states. We also intend to better study the market possibility to introduce the MD+RAS (or their concept, or an extended version thereof). SANTA-G: The enabling technology for the SANTA-G framework, the CanonicalProducer, developed by this task, became an integral part of the R-GMA system. It is currently being further developed, as the OnDemandProducer, within the EGEE project, and is expected to be further exploited within EGEE and relying parties. The JIMS service: JIMS exploitation plans concern Grid installations interested in modular system for monitoring infrastructure, network and Grid engines using the mechanism of pluggable modules loaded on demand. The CrossGrid scheduler: Using GMDAT for data taking and predictions in EGEE and LCG - the tool is going to be used by researchers working on setting up operational Grid in federations within EGEE project. The OCM-G monitoring service: Developing automatic performance analysis systems - the research results will be integrated into future automatic performance analysis systems in cooperation with the University of Siegen. The Grid Visualization Kernel - GVK: Continued Development: within the nationally-funded Austrian Grid project we will extend the functionality of GVK for supporting the visualization tasks arising within the Austrian Grid project. Data Access Optimization - UDAL: UDAL is based on the Component-Expert Architecture making the layer very flexible and easy adaptable for changes. We want to exploits that approach to other problems such as automatic contextual service matching in a Grid infrastructure. International Testbed Organization: The CrossGrid testbed, having installed the LCG-2 middleware distribution, is fully compliant with the infrastructure of the EGEE project and will be further supported in the framework of this project.

Overview of all your main project results

No.	Self-descriptive title of the result	Category A, B or C*	Partner(s) owning the result(s) (referring in particular to specific patents, copyrights, etc.)
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			& involved in their further use
1	Virtual Medical Support (application)	A	Universiteit van Amsterdam
2	Flood Crisis Support (application)	A	Ustav Informatiky, Slovenska Akademia Vied
3	High Energy Physics Data Analysis (application)	A	Consejo Superior de Investigaciones Cientificas
4	High Energy Physics Data Filtering (application)	A	Instytut Fizyki Jadrowej im. Henryka Niewodniczanskigo w Krakowie Andrzej Soltan Institute for Nuclear Studies
5	Weather Forecasting and Air Pollution Modeling (application)	A	Uniwersytet Warszawski Universidade de Santiago de Compostela Consejo Superior de Investigaciones Cientificas
6	MARMOT - MPI Analysis and Checking Tool	A	Universitaet Stuttgart, High Performance Computing Center
7	GridBench: A software workbench and benchmark suite for Grid	A	University of Cyprus
8	Performance evaluation tool for interactive grid applications GRIPA (G-PM)	A	Technische Universitaet Muenchen CYFRONET
9	Performance Prediction Component	A	Universidade de Santiago de Compostela
10	Portal	A	Algosystems S.A. University of Cyprus Instytut Chemii Bioorganicznej PAN w Poznaniu
11	Migrating Desktop & Roaming Access Server	A	Datamat S.P.A. Instytut Chemii Bioorganicznej PAN w Poznaniu
12	Scheduler - Resource Broker	A	Universitat Autonoma de Barcelona Consejo Superior de Investigaciones Cientificas Datamat S.P.A.
13	Grid Application Monitoring System GRIMO (OCM-G)	A	Technische Universitaet Muenchen CYFRONET
14	Santa-G - Grid Monitoring Tool	A	The Provost Fellows and Scholars of The College of The Holy and Undivided Trinity of Queen Elizabeth Near Dublin
15	JIMS - JMX-based Infrastructure Monitoring System.	A	CYFRONET
16	Optimization of Data Access	A	CYFRONET
17	International Grid Computing Infrastructure (testbeds)	A	Consejo Superior de Investigaciones Cientificas The Provost Fellows and Scholars of The College of The Holy and Undivided Trinity of Queen Elizabeth Near Dublin Ustav Informatiky, Slovenska Akademia Vied Universidade de Santiago de Compostela Laboratorio de Instrumentacao e Fisica Experimental de Particulas Instytut Fizyki Jadrowej im. Henryka Niewodniczanskigo w Krakowie Uniwersytet Warszawski Forschungszentrum Karlsruhe GmbH National Centre for Scientific Research Universitat Autonoma de Barcelona Aristotle University of Thessaloniki Instytut Chemii Bioorganicznej PAN w Poznaniu Universiteit van Amsterdam University of Cyprus CYFRONET Andrzej Soltan Institute for Nuclear Studies
18	Grid Visualization Kernel	A	Johannes Kepler Universitaet Linz
19	High Level Architecture Support	A	CYFRONET Universiteit van Amsterdam

*A: results usable outside the consortium / B: results usable within the consortium / C: non usable results

Quantified Data on the dissemination and use of the project results

Items about the dissemination and use of the project results (consolidated numbers)	Currently achieved quantity	Estimated future* quantity
Product innovations	18	
Process innovations	1	
New services (commercial)		
New services (public)	1	
New methods	4	
Scientific breakthrough	1	
Technical standards to which this project has contributed	3	
EU regulations/directives to which this project has contributed		
International regulations to which this project has contributed		
PhDs generated by the project	2	2
Grantees/trainees including transnational exchange of personnel	200	120

* "Future" means expectations within the next 3 years following the end of the project

Comment on European Interest

Community added value and contribution to EU policies

European dimension of the problem

From its inception, CrossGrid has aimed at solving problems of importance to the European research area and the European society - thus, the Project has tackled a variety of societal and environmental challenges with a significant European scope (affecting many countries simultaneously) - such as cardiovascular diseases, flooding crises, particle physics and air pollution. In addition, the Project has contributed significantly to developing Grid technology in the area of interactive applications and the installation and maintenance of a pan-European Grid computing infrastructure, thus ensuring European leadership in this area of information sciences.

Contribution to developing S&T co-operation at international level. European added value

The Project has succeeded in bringing together various organizations and institutions with shared interests, distributed through the European Union, thus enabling better exploitation of synergies and transnational scientific cooperation - as has already been expressed in a number of post-CrossGrid research and infrastructural IST projects such as BalticGrid, K-WfGrid, CoreGrid or contributions to the EGEE initiative. The CrossGrid testbed, now integrated in the EGEE infrastructure, serves as a unifying medium for a number of national and cross-border projects and enables the European scientific community to address challenges which would otherwise prove insurmountable for individual organizations (in particular, it provides vital computational resources to the LHC collider now under construction at CERN).

Contribution to policy design or implementation

CrossGrid consortium members have always been keenly interested in participating and shaping EU and other international policies governing the Grid computing research area. From the very beginning of the Project's development cycle, cooperation has been maintained between CrossGrid and other European and international Grid projects, such as Globus, DataGrid, GridLab and GridStart. Particularly close contacts have been maintained with the DataGrid project. As a result of the joint effort of both projects, a common European Grids Industry and Research Forum was formed. Another important event spawned by the CrossGrid project is the Cracow Grid Workshop - an international conference devoted to emerging trends in Grid computing. In addition, CrossGrid project members have taken active part in over a dozen working groups of GridStart and the Global Grid Forum, attending GGF events and delivering talks.

Contribution to Community social objectives**Improving the quality of life in the Community:**

The applications developed as part of the CrossGrid project aim at improving the European quality of life and addressing problems important from the point of view of the Community. The CrossGrid medical application stems from the need to research and aid in the treatment of cardiovascular diseases, which are of particular concern in developed countries. Furthermore, the CrossGrid flood crisis support, air pollution modeling and large-scale weather forecasting applications all directly deal with environmental problems which affect numerous European states. We believe that the Grid computing infrastructure plays a key role in securing the necessary quantity of computing resources needed to effectively implement and operate these kinds of applications.

Provision of appropriate incentives for monitoring and creating jobs in the Community (including use and development of skills):

In addition to direct development of software tools and applications, as described above, CrossGrid has taken care to develop European expertise in the area of Grid computing research, ensuring the existence of a dedicated and viable Grid development community even after the conclusion of the Project. While direct exploitation of Project results is described in a separate section of this TIP, it should be noted that CrossGrid virtual organizations and its developer community have already been involved in a number of successful project proposals and other initiatives stemming from their participation in CrossGrid - one can mention such initiatives as BalticGrid, CoreGrid and K-WfGrid as well as numerous national research and infrastructure development projects involving industry representatives.

Supporting sustainable development, preserving and/or enhancing the environment (including use/conservation of resources):

While CrossGrid in itself is a computing project and thus does not directly deal with issues such as conservation of natural resources and enhancing the environment, it should be noted that some CrossGrid applications - in particular the weather forecasting and air pollution modeling Virtual Organization - attempt to tackle these issues and that the computing resources provided by Grid infrastructures in general and CrossGrid in particular enable them to advance their goals.

Expected project impact (to be filled in by the project coordinator)

EU Policy Goals	I SCALE OF EXPECTED IMPACT OVER THE NEXT 10 YEARS -1 0 1 2 3	II other	
		Not applicable to project	Project Impact too difficult to estimate
1. Improved sustainable economic development and growth, competitiveness	1		
2. Improved employment	1		
3. Improved quality of life and health and safety	1		
4. Improved education	2		
5. Improved preservation and enhancement of the environment	1		
6. Improved scientific and technological quality	2		
7. Regulatory and legislative environment	1		
8. Other	0		

1. Economic development and growth, competitiveness	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Increased Turnover for project participants - national markets	0	0
b) Increased Turnover for project participants - international markets	0	0
c) Increased Productivity for project participants	0	0
d) Reduced costs for project participants	1	1
e) Improved output quality/high technology content	2	2

2. Employment	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Safeguarding of jobs	1	1
b) Net employment growth in projects participants staff	2	1
c) Net employment growth in customer and supply chains	0	0
d) Net employment growth in the European economy at large	0	0

3. Quality of Life and health and safety	Scale of Expected Impacts over the next 10 years
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	(2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Improved health care	1	1
b) Improved food, nutrition	0	0
c) Improved safety (incl. consumers and workers safety)	0	0
d) Improved quality of life for the elderly and disabled	0	0
e) Improved life expectancy	0	0
f) Improved working conditions	1	1
g) Improved child care	0	0
h) Improved mobility of persons	0	0

4. Improved education	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Improved learning processes including lifelong learning	0	0
b) Development of new university curricula	2	2

5. Preservation and enhancement of the environment	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Improved prevention of emissions	1	1
b) Improved treatment of emissions	1	1
c) Improved preservation of natural resources and cultural heritage	1	1
d) Reduced energy consumption	0	0

6. S&T quality	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Production of new knowledge	2	1
b) Safeguarding or development of expertise in a research area	2	1
c) Acceleration of RTD, transfer or uptake	2	1
d) Enhance skills of RTD staff	2	1
e) Transfer expertise/know-how/technology	1	1
f) Improved access to knowledge-based networks	0	0
g) Identifying appropriate partners and expertise	2	1
h) Develop international S&T co-operation	3	1
i) Increased gender equality	1	1

7. Regulatory and legislative environment	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Contribution to EU policy formulation	1	1
Contribution to EU policy implementation	2	1

8. Other (please specify)	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3

Description of Results

No.	Title
1	Virtual Medical Support (application)

CONTACT PERSON FOR THIS RESULT

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SUMMARY

We built a prototype of a Grid-based problem-solving environment (PSE) for virtual vascular surgery. We use a set of hardware and software resources available via the CrossGrid infrastructure for building a specific framework to support vascular surgeons and interventional radiologists in their pre-operative decision-making. We achieved secure Grid access, node discovery and registration, Grid data transfer, application initialization, medical data segmentation, segmented data visualization, computational mesh creation, job submission, distributed blood flow visualization, and bypass creation. We have incorporated the medical application for vascular reconstruction into the Grid. The input for experiments is the data from a medical image repository in Leiden. The patient's blood flow is simulated using Grid resources. An efficient mesoscopic computational haemodynamics solver for blood-flow simulations is based on parallel cellular automata. We are able to simulate pulsatile Newtonian flow in a straight rigid 3D tube. To allow for the parallel execution, the simulation volume is divided into several sub-volumes, and each sub-volume is processed concurrently. To ensure good user experience will build a unique desktop Virtual Reality system, which serves as the interaction-visualization front-end for the user manipulations over the Grid. End-users can interact with the system via a multi-modal interface, which combines natural input modes of context sensitive interaction by voice, hand gestures and direct manipulation of virtual 3D objects. We call it the Virtual Operating Theatre, as a user can 'play' the role of a vascular surgeon planning and conducting the treatment of a vascular disease on a virtual simulated patient.

SUBJECT DESCRIPTORS CODES

74 BIOMEDICAL SCIENCES
 95 CARDIOVASCULAR SYSTEM
 108 CLINICAL RESEARCH, CLINICAL TRIALS, COMPUTERISED CLINICAL SYSTEMS
 129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL
 152 DECISION SUPPORT TOOLS
 381 MEDICAL SCIENCES/RESEARCH
 661 VIRTUAL REALITY

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Tick	NoP ¹⁾	NoI ²⁾	Current Details	Foreseen Tick	Details
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓			Universiteit van Amsterdam		
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
73 Research and development
80 Education
85 Health and social work

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Prototype/demonstrator available for testing
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	0	0
Number of (public or private) entities potentially involved in the implementation of the result:	1	1
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people	5	17
S&T publications (referenced publications only)	26	10
publications addressing general public (e.g. CD-ROMs, WEB sites)	3	3
publications addressing decision takers / public authorities / etc.	0	0
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	✓
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering expertise in the development of interactive problem solving environments, distributed systems, high-performance algorithms, computational fluid dynamics, immersive, augmented and desktop visualization systems.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

End-users interested in the exploitation of a Grid-enabled biomedical application for vascular reconstruction from both hospitals and medical educational institutes and universities.

No.	Title
2	Flood Crisis Support (application)

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	

SUMMARY

The flood forecasting application framework with appropriate simulation models enable users to easily run the desired sequence of simulations and respective post-processing tools, browse the results of simulations, register results into the replica management service and applicable metadata into the metadata catalog for later search and retrieval. The flood forecasting application consists of several simulation models (meteorological, hydrological and hydraulic) and appropriate post-processing tools connected together, thus constituting a workflow. The meteorological model is used to forecast precipitation, to be used by the hydrological model for computation of discharge of the river. That is used in the final step for actual computation of possible flood by the hydraulics model. All the models generate binary output data, which are then used by post-processing tools to generate pictures visualizing the situation. These pictures are then used by respective experts for situation evaluation. The flood forecasting application has two user interfaces to enable users to interact with the application in a more user-friendly way. One interface is implemented as a web portal accessible by standard web browser. It consists of a set of portlets – reusable web components – that are placed in the portlet portal framework. Another user interface is implemented as plug-in for Migrating Desktop (MD) – a desktop user environment for working with grids developed (see MD results page). While the portal interface focuses mainly on the flood application, MD is a general tool that enables a user to work with grid in a flexible way. It also integrates other applications via its plug-in system.

SUBJECT DESCRIPTORS CODES

138 COOPERATIVE WORKING
152 DECISION SUPPORT TOOLS
280 HAZARDS: NATURAL
510 PROGRAMMING/INFORMATION SYSTEMS
565 SIMULATION, SIMULATION ENGINEERING
579 SOFTWARE ENGINEERING, MIDDLEWARE, GROUPWARE
660 VIRTUAL ORGANISATIONS

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
FloodGrid Application developer manual	FloodGrid developer's manual contains information on how to extend the FloodGrid application by new modules. Visit: http://www.eu-crossgrid.org/developer_manuals/CG1.2-DM-v0.9-IISAS-FloodAppDeveloperManual.pdf	Public
FloodGrid Application user manual	FloodGrid user's manual contains information on how to use the FloodGrid application. Visit: http://www.eu-crossgrid.org/user_manuals/CG1.2-v1.0-IISAS-FloodUserManual.pdf	Public
FloodGrid application leaflet	Brochure with basics of FloodGrid application. Visit: http://dissemination.crossgrid.org/modules.php?name=Downloads&d_op=getit&lid=37	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current	Foreseen	Tick	Details	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓			Use of this product is subject to the terms and licenses stated in the GNU General Public License agreement.		
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
41 Collection, purification and distribution of water
66 Insurance and pension funding, except compulsory social security
72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Experimental development stage (laboratory prototype)
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	12	0
Number of (public or private) entities potentially involved in the implementation of the result:	1	1
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people	1	3
S&T publications (referenced publications only)	8	6
publications addressing general public (e.g. CD-ROMs, WEB sites)	2	2
publications addressing decision takers / public authorities / etc.	0	2
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result
COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	✓
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement	✓	INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	We are looking support for further improvement of the FloodGrid tools (portal), on one hand, and partner(s) who can undertake to commercialize the tools, on the other hand.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering the know-how and expertise in building application portals (user interface), adding simulation models, visualization of results, collaboration tools.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Potential partners should have a good expertise in software engineering, marketing, software licensing.

No.	Title
3	High Energy Physics Data Analysis (application)

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	http://grid.ifca.unican.es/crossgrid

SUMMARY

The next generation High Energy Physics (HEP) experiments at the Large Hadron Collider (LHC) would produce an unprecedented amount of data. A worldwide spread community of thousands of physicists willing to analyze that data would profit of grid technologies for this work. We have parallelized some algorithms that could be used during this analysis what would save a great amount of time to scientists doing this kind of analysis. The artificial neural network (ANN) training application is an interactive program that trains a n ANN with simulated HEP events, in order to being able to distinguish the interesting events (signal) from the already known ones (background). Thanks to the parallelization of the program, and to its good scalability, the wait time for this kind of analysis has been reduced from several hours to a few minutes. A graphical user interface is provided through the CrossGrid Migrating Desktop (MD). Using it the user can monitor the training process through the training error evolution, and can interrupt it, or reset the weights to be sure of avoiding local minima.

SUBJECT DESCRIPTORS CODES

481 PHYSICAL SCIENCES
464 PARTICLE PHYSICS/FIELDS THEORY
150 DATABASES, DATABASE MANAGEMENT, DATA MINING
660 VIRTUAL ORGANISATIONS

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
ANN Application User Manual	Instructions for using the ANN training application. Visit: http://grid.ifca.unican.es/crossgrid/Archivos/usermanual.pdf	Public
Interactive ANN training Demo	A video showing the application running from the Migrating Desktop and an accompanying slideshow can be found at: http://grid.ifca.unican.es/crossgrid/final_demo.html	Public
HEP Brochure	Dissemination brochure. Visit: http://dissemination.crossgrid.org/modules.php?name=Downloads&d_op=getit&id=43	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Tick	Details	Tick	Details	
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick		
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights	✓			http://www.eu-crossgrid.org/CrossGrid_Software_Licence.pdf			
Secret know-how							
Other - please specify:							

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Experimental development stage (laboratory prototype)
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	0	0

Number of (public or private) entities potentially involved in the implementation of the result:	1	1
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people	15	50
S&T publications (referenced publications only)	3	3
publications addressing general public (e.g. CD-ROMs, WEB sites)	1	1
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	NO	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	√	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	√
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

No.	Title
4	High Energy Physics Data Filtering (application)

CONTACT PERSON FOR THIS RESULT

Name	Piotr MALECKI
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Specific Result URL	

SUMMARY

Modern high energy physics experiments use multilevel trigger systems to select very rare ($10E-13$) events with interesting physics phenomena, subject for further studies. Performance of the third level of the triggering system for the ATLAS experiment at the LHC collider at CERN, which will generate over 40 millions interactions per second, depends on complex analysis programs executed on ordinary PCs. Current estimate soars for 3500 processors necessary to perform the selection process. Some of these processors can be sought for in remote locations providing good connection is available. Using custom designed measurement system, based on programmable 1Gbps Network Interface Cards (NICs) and the Global Positioning System (GPS), we demonstrated that the long haul connection between CERN-Geneva-Switzerland and Cyfronet-Krakow-Poland using pan-european GEANT network and Polish National Research and Education Network (NREN) Pionier can provide almost 1 Gbps throughput. The network QoS measurements were followed by integration phase where initial merge of the CrossGrid services and the ATLAS High Level Trigger system (HLT) was implemented. Thus we demonstrated a possible solution to cater deficit of the CPU power for the HLT system for ATLAS. The first results however, in terms of achieved throughput, were much below the expected limit with a clear indication of transmission bottleneck being the TCP/IP protocol and request-response type of communication implemented in the HLT system. The latter is especially sensitive to long latencies observed in the long distances. We plan to continue our research using the CrossGrid testbed. The work did so far can become a foundation for continuation studies leading to design of mechanisms aimed at improving the long haul transfers of large data in real time.

SUBJECT DESCRIPTORS CODES**DOCUMENTATION AND INFORMATION ON THE RESULT**

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Tick	NoP ¹⁾	NoI ²⁾	Current Details	Foreseen Tick	Details
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	√			CG licence		
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors

CURRENT STAGE OF DEVELOPMENT

Current stage of development	
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)		
Number of (public or private) entities potentially involved in the implementation of the result: of which: number of SMEs:		
of which: number of entities in third countries (outside EU):		
Targeted user audience: of reachable people		
S&T publications (referenced publications only)		
publications addressing general public (e.g. CD-ROMs, WEB sites)		
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development		FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

No.	Title
5	Weather Forecasting and Air Pollution Modeling (application)

CONTACT PERSON FOR THIS RESULT

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URL	
Specific Result URL	

SUMMARY

The air pollution application provides a high performance air quality simulation executing the STEM-II (Sulphur Transport Eulerian Model 2) program on a Grid platform. The MPI parallel version of the model, previously developed by our research group, was ported to the Grid by making use of the other CrossGrid components. Besides, the Grid enabled version was enhanced with a graphical user interface that provides interactivity features, and the inclusion of a fault tolerance mechanism based on checkpointing. The main benefit of this kind of application is savings on environmental resources due to a better pollutant spread simulation. Possible end users are local authorities, weather prediction units and energy plants among others.

SUBJECT DESCRIPTORS CODES

197 ENERGY AND CLIMATE CHANGE
207 ENVIRONMENT, ENVIRONMENTAL SCIENCE
213 ENVIRONMENTAL TECHNOLOGY/ENGINEERING, POLLUTION CONTROL
510 PROGRAMMING/INFORMATION SYSTEMS
565 SIMULATION, SIMULATION ENGINEERING

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Brochure	http://dissemination.crossgrid.org/modules.php?name=Downloads&d_op=getit&lid=44	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Tick	Details	Tick	Details	
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick		
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights	✓			http://www.eu-crossgrid.org/CrossGrid_Software_Licence.pdf			
Secret know-how							
Other - please specify:							

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

61.1 Sea and coastal water transport
72 Computer and related activities
73 Research and development
74 Other business activities
75 Public administration and defence; compulsory social security

CURRENT STAGE OF DEVELOPMENT

Current stage of development	
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)		12
Number of (public or private) entities potentially involved in the implementation of the result:		3
of which: number of SMEs:		0
of which: number of entities in third countries (outside EU):		0

Targeted user audience: of reachable people		
S&T publications (referenced publications only)	4	5
publications addressing general public (e.g. CD-ROMs, WEB sites)		
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result
COLLABORATIONS SOUGHT

R&D	Further research or development		FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	We are looking for more power plants interested in the application				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE
PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

No.	Title
6	MARMOT - MPI Analysis and Checking Tool

CONTACT PERSON FOR THIS RESULT

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URL	http://www.hlrs.de
Specific Result URL	http://www.hlrs.de/organization/tsc/projects/marmot

SUMMARY

The Message Passing Interface (MPI) is a widely used standard to write parallel programs using message passing. However, developers of such MPI applications do not only have to face all the problems that occur in serial programming. In addition, parallel applications get more and more complex and thus also more error prone. Moreover, MPI programs do not always behave deterministically. Deadlocks or race conditions may appear, depending on the platform environment or on the MPI implementation. What is worse, they may only appear sometimes. Thus, it may take the user or developer quite a long time until he even realises that the program gives wrong results, but only sometimes. Another issue is the fact that the MPI standard leaves many decisions to the implementation, which may cause problems when porting an application from one platform to another, for example, when porting an application from a local platform to the CrossGrid testbed. Tracking down bugs in a distributed program can be a long and painful task, therefore there is a clear need for tools that support the MPI application developer during the development process. MARMOT is such an MPI application development tool that checks automatically at run-time whether an application conforms to the MPI-standard and uses e.g. MPI resources such as communicators, groups or data types in a correct way. It also verifies if the application contains non-portable constructs and thus ensures that the application runs seamlessly on any platform in the Grid. The tool can also detect problems such as deadlocks and race conditions. Any CrossGrid application can be run with MARMOT. Using the Migrating Desktop, the application can be launched and the results of MARMOT can be monitored. Currently there are only two tools similar to MARMOT: MPI-CHECK from University of Iowa, which is restricted to Fortran code, and Umpire from Lawrence Livermore National Laboratory, which is not publicly available. MARMOT supports the MPI-1.2 standard (C and Fortran language binding) and is freely available. Extending its functionality, e.g. to MPI-2 or hybrid applications, is an ongoing effort.

SUBJECT DESCRIPTORS CODES

130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING
318 INFORMATICS
321 INFORMATION TECHNOLOGY/SCIENCE

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
MARMOT - website	All important information (documentation, publications, download) can be found at http://www.hlrs.de/organization/tsc/projects/marmot	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate			
	Tick	NoP ¹⁾	NoI ²⁾	Current Details	Foreseen Tick	Tick	Details
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights	✓			Copyright HLRS,GPL license			
Secret know-how							
Other - please specify:							

- 1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	12	12
Number of (public or private) entities potentially involved in the implementation of the result:	1	3
of which: number of SMEs:	1	2

of which: number of entities in third countries (outside EU):	0	1
Targeted user audience: of reachable people		
S&T publications (referenced publications only)	6	6
publications addressing general public (e.g. CD-ROMs, WEB sites)	1	1
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	√	FIN	Financial support	√
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering expertise in MPI application development, especially in the implementation and use of MARMOT, the MPI Analysis and Checking Tool.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

- Companies /research institutes who are interested in further development of MARMOT. - Application developers who are interested in testing and using MARMOT.

No.	Title
7	GridBench: A software workbench and benchmark suite for Grid

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	http://grid.ucy.ac.cy/GridBench

SUMMARY

GridBench is a tool for evaluating the performance of Grids and Grid resources through benchmarking. It facilitates the easy definition of parameterized execution of benchmarks on the Grid, while at the same time allowing for archival and retrieval of results and the creation of customized charts from these results. GridBench comprises a framework of tools and a suite of benchmarks. The tools provide a user-friendly graphical interface for defining, executing and administrating benchmarks upon the resources of a Virtual Organization (VO), as well as for browsing results. Additionally, it provides tools for archiving and analysing results through the easy construction of custom graphs. GridBench leverages new and existing benchmarks from the HPC community. New Benchmarks complement the tried and respected HPC benchmarks, that have been adapted to run the Grid. GridBench can be used by Grid-infrastructure administrators to assess the performance and functionality of their resources. It can also be used by application developers and end-users who want to rank available resources and decide where to submit their jobs. For more information, please check the [GridBench Web Site](#).

SUBJECT DESCRIPTORS CODES

579 SOFTWARE ENGINEERING, MIDDLEWARE, GROUPWARE
321 INFORMATION TECHNOLOGY/SCIENCE
318 INFORMATICS
510 PROGRAMMING/INFORMATION SYSTEMS
443 OBSERVATION SYSTEMS / CAPACITY / DATASETS / INDICATORS

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
GridBench brochure	Download as PDF	Public
GridBench Installation Guide	The installation guide is available online in pdf format .	Public
GridBench Developer Manual	This is the developer manual for GridBench, a tool for benchmarking Grid Resources. This document describes the software architecture and implementation, and it complements the GridBench Installation Guide and the GridBench User Guide. It is available in pdf .	Public
GridBench User Guide	This document explains what you need to know as a user of the GridBench system. It describes the usage of the GridBench Graphic User Interface. It is available in pdf .	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Details	Current	Foreseen	Details
	Tick	NoP ¹⁾	NoI ²⁾	Tick		
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓					Use of this product is subject to the terms and licenses stated in the CrossGrid License Agreement .
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Prototype/demonstrator available for testing
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity

Time to application / market (in months from the end of the research project)		24
Number of (public or private) entities potentially involved in the implementation of the result:	1	1
of which: number of SMEs:		
of which: number of entities in third countries (outside EU):		
Targeted user audience: of reachable people	21	100
S&T publications (referenced publications only)	4	3
publications addressing general public (e.g. CD-ROMs, WEB sites)	1	
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	✓
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	✓
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement	✓	INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We provide a user-friendly system for benchmarking Grid resources and conducting various performance and reliability analyses. This system can be useful for Grid application developers, Grid end-users, and Grid infrastructure operators. We provide our expertise in customizing and extending the system.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Grid end-users, Grid infrastructure operators.

No.	Title
8	Performance evaluation tool for interactive grid applications GRIPA (G-PM)

CONTACT PERSON FOR THIS RESULT

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E-mail	funika@agh.edu.pl
URL	http://www.icsr.agh.edu.pl
Specific Result URL	http://www.eu-crossgrid.org

SUMMARY

GRIPA (G-PM) is a performance evaluation tool for interactive Grid applications (both sequential ones and parallel applications based on MPI). It can be used by the community of program developers as well as knowledgeable program users to investigate the performance of applications, especially, to help in discovering performance bottlenecks. The tool consists of three components: a Performance Measurement Component (PMC), a High Level Analysis Component (HLAC), and a User Interface and Visualization Component (UIVC). The distinguished new features of GRIPA (G-PM) and especially the HLAC are: - It supports on-line analysis, i.e. the performance can be evaluated while the program is running. This allows immediate correlation to user interactions and is a prerequisite for interactive application steering. - It supports both automatic and user-defined instrumentation. In addition, it enables the user to define new (possible application-specific) metrics, based on the existing metrics and the user-defined instrumentation. Such a feature has never before been implemented in an on-line performance analysis tool.

SUBJECT DESCRIPTORS CODES

510 PROGRAMMING/INFORMATION SYSTEMS
318 INFORMATICS
321 INFORMATION TECHNOLOGY/SCIENCE
443 OBSERVATION SYSTEMS / CAPACITY / DATASETS / INDICATORS
522 QUALITY, QUALITY CONTROL, TRACEABILITY

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
G-PM user manual	G-PM user's manual contains information on how to use the G-PM tool: User Interface Reference Guide, PMSL Reference Guide, and some hints on troubleshooting. Download as PDF	Public
G-PM Developer manual	G-PM Developer's Manual contains information on how to further extend the tool's functionality: details on the implementation structure and product testing. Download as PDF	Public
G-PM Installation guide	G-PM Installation Guide contains information on how to install and run G-PM: performing installation in the CrossGrid testbed, step-by-step installation from sources and RPM, and running/testing the installed tool. Download as PDF	Public
G-PM Brochure	Download as PPT	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current			Foreseen	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓			Use of this product is subject to the terms and licenses stated in the GNU General Public License agreement.		
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development
80 Education

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)		36
Number of (public or private) entities potentially involved in the implementation of the result:	2	3
of which: number of SMEs:		
of which: number of entities in third countries (outside EU):		
Targeted user audience: of reachable people	4	20
S&T publications (referenced publications only)	10	
publications addressing general public (e.g. CD-ROMs, WEB sites)		
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result**COLLABORATIONS SOUGHT**

R&D	Further research or development	✓	FIN	Financial support	✓
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement	✓	INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	Owing to the capability of defining the performance metrics by the user and suitably presenting the measurement results, the performance evaluation tool, GRIPA (G-PM), enables to thoroughly investigate possible reasons for insufficient performance of Grid interactive applications and can be largely extended by new domains of use and visual presentation modes. It can be ported into further distributed systems like p2p systems, web-service based programming, etc. Next, the measurement information from the tool can be used by further high-level analysis tools.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering a powerful, extendible tool for performance evaluation of interactive grid applications, which can be flexibly adjusted to the particular features of the applications, owing to the capability of defining performance metrics by the user. The tool can be used by the application developers' community as well as by the end users of applications. We are offering the know-how and expertise in building performance measurement processes, graphical user interface, performance visualization, and high level performance analysis.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

1. The skills necessary for the dissemination and use of the result should be provided by a research group specialized in software engineering. 2. An application-oriented partner is also being required, with large expertise in building grid applications. 3. A partner with expertise in commercializing software and software licensing is also needed.

No.	Title
9	Performance Prediction Component

CONTACT PERSON FOR THIS RESULT

Name	Francisco FERNANDEZ-RIVERA
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URL	www.usc.es
Specific Result URL	http://www.ac.usc.es/~fran

SUMMARY

The global purpose of the PPC tool is to provide performance information about some selected computational kernels when they are executed in a grid. In some cases, this information is just predicted (execution times, communication overheads, ...), in others it is, in fact, real (number of communications, load balance, ...). The predicted data are based on analytical models obtained from exhaustive monitored measurements. The kernels that are considered include both applications dependent and general purpose. In addition, the tool includes a Graphical User Interface (GUI) to help the user to establish the features of the grid, and then, to simulate their effects on the target parallel kernels. Therefore, information about the behavior of the kernels under different virtual system configurations can be extracted and visualized. This tool can be run in a single workstation or PC, because no grid computations are involved. The end users of this tool are Grid programmers who want to know the behaviour of their programs under different grid scenarios, as well as resource brokers. Another possible use of this tool is in academic institutions to study the way in which grids behave.

SUBJECT DESCRIPTORS CODES

510 PROGRAMMING/INFORMATION SYSTEMS
579 SOFTWARE ENGINEERING, MIDDLEWARE, GROUPWARE

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
PPC developer 's manual	PPC developer 's manual contains information on how to further extend the tool's functionalities: http://www.eu-crossgrid.org/developer_manuals/CG2.3.2-v1.0-USC-PPCDeveloperManual.pdf	Public
PPC user manual	PPC user 's manual contains information about how to use the tool, paying attention to the Graphical User Interface. http://www.eu-crossgrid.org/user_manuals/CG2.3.2-v1.0-USC-PPCUserManual.pdf	Public
PPC installation manual	PPC installation guide provides information on how to install the tool. http://www.eu-crossgrid.org/installation_guides/CG2.3.2-v1.1-USC-PPCInstallGuide.pdf	Public
PPC brochure	Download it in: http://dissemination.crossgrid.org/modules.php?name=Downloads&d_op=getit&lid=68	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current	Foreseen	Details	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Tick	Details
Patent applied for					
Patent granted					
Patent search carried out					
Registered design					
Trademark applications					
Copyrights	√				CrossGrid licence
Secret know-how					
Other - please specify:					

- 1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Prototype/demonstrator available for testing
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	15	15
Number of (public or private) entities potentially involved in the implementation of the result:	1	3

of which: number of SMEs:	0	1
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people	100	150
S&T publications (referenced publications only)	5	8
publications addressing general public (e.g. CD-ROMs, WEB sites)	2	2
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	NO	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	✓
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	We are looking for partners interested in performance analysis of grid enabled applications and middleware related tools.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering performance prediction information based on monitoring and application parameters. We are looking for more monitoring tools, and middleware tools that can use our performance information like schedulers and resource brokers.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Potential partners should have a good expertise in development of middleware tools for grid environments.

No.	Title
10	Portal

CONTACT PERSON FOR THIS RESULT

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URL	
Specific Result URL	

SUMMARY

The Portal that was developed in the context of the CrossGrid project had as primary goal the provision of a user-friendly web-based interface, through which the potential user would be able to submit jobs to the Grid. There is co-operation between the Portal and the Job Submission Services (JSS), which is software that resides on the Roaming Access Server (RAS). These two "components" were developed and are being maintained by other project partners. The Portal's building blocks are the portlets, all of which are visible on the portal page. Each portlet performs a specific function and all of them provide the user with the ability of submitting a job on the Grid, watching its status, and retrieving the output files upon execution. Thus, they cover all steps of the lifecycle of a Grid job. First, there is the Proxy Manager portlet. This has a key role in the Portal, since it is responsible for the authentication and authorization of the user, in order to be able to have access to the rest of the portlets. The authentication and authorization take place as soon as the user has valid credentials delegated in a MyProxy server that is located in the CrossGrid testbed. The valid proxy certificate will be retrieved by the Proxy Manager portlet, and the user will automatically gain access to all portlets that can be found on the Portal page. These range from simple ones that perform submission of a simple job on the CrossGrid testbed to portlets that perform submission of specific large applications. As soon as the user submits any kind of job, he is immediately able to watch its status as it is being carried out, until it has finished. There are also some other generic portlets (Job List Match, Job Log Info), which give information about the available testbed machines that are able to run a specific job or trace each step of the job from the time that is submitted until the time that is finished and some output (or error) has been produced. The Job Get Output portlet is an important function of the Portal. Through this, the user can retrieve the output and/or error from a submitted job. The results can be obtained via HTML links to the output and error files, which are shown inside the portlet area.

SUBJECT DESCRIPTORS CODES

510 PROGRAMMING/INFORMATION SYSTEMS
130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING
131 COMPUTER-BASED TRAINING
121 COMMUNICATION SCIENCES/HUMAN COMPUTER INTERACTIONS
129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Portal Installation Guide	http://www.eu-crossgrid.org/installation_guides/CG3.1-v1.0-ALGO-ApplicationPortalInstallGuide.doc	Public
Portal User Manual	http://www.eu-crossgrid.org/user_manuals/CG3.1-v1.0-ALGO-ApplicationPortalUserManual.pdf	Public
Portal Developer Manual	http://www.eu-crossgrid.org/developer_manuals/CG3.1-v1.0-ALGO-ApplicationPortalDeveloperManual.pdf	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Tick	Details	Tick	Details	
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	Details	
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights	✓			http://www.eu-crossgrid.org/CrossGrid_Software_Licence.pdf			
Secret know-how							
Other - please specify:							

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development
80 Education

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
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Other:	
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Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)		
Number of (public or private) entities potentially involved in the implementation of the result:		
of which: number of SMEs:		
of which: number of entities in third countries (outside EU):		
Targeted user audience: of reachable people		50
S&T publications (referenced publications only)		
publications addressing general public (e.g. CD-ROMs, WEB sites)		5
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result
COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Our input and gains from our involvement in the project, in a nutshell: 1)Development of the CrossGrid Portal Toolkit, a framework for developing Grid portals based on Java and XML technologies. 2)The portal provides access to large-scale applications through a single Web interface. 3)Establishment of the needed Grid related infrastructure at company's premises. We have invested in the specific software development and we gained relevant knowledge from our participation in the project. We want to further develop what we have achieved up to now and we are already continuing with this investment, in terms of participating to a new Grid-related project.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

The partners should have at least some basic knowledge regarding the field of Grid Computing in general, and they should be interested in learning more and investing into it.

No.	Title
11	Migrating Desktop & Roaming Access Server

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	http://ras.crossgrid.man.poznan.pl/crossgrid/

SUMMARY

The Migrating Desktop is ready to use GUI framework for accessing the grid resources in a uniform way. The user can access their data and run applications from any Internet terminal equipped with the Java Virtual Machine. This facility offers the environment, which is fully configurable, and adaptable to the user needs, it gives a transparent user work environment, independent of the system version and hardware. The Migrating Desktop supports all the grid paradigms such like the following: single sign-on and trust, monitoring jobs, job and data management, Virtual Organizations, interactive jobs, plugins, etc. This solution is a complete, production-deployed software environment with special focus on interactive grid applications. These applications are simultaneously compute- as well as data-intensive and are characterized by the interaction with a person in a processing loop. It can be used by the scientific community for simulating of the complex problems and it covers the requirement for 'utility computing' concept in business too. We foreseen, that the Migrating Desktop can give the access to the set of business applications by providing the graphical front-end to the applications and database engines distributed across the company. Utility computing is a combination of two approaches: according to the first one companies can call upon a third party to host and manage their IT infrastructure, and according to the second one, companies can pay for the resources they use. Grid computing is similar to utility computing but with a different approach. Grid computing is a form of virtualization that can handle computation-intensive tasks, using a large number of systems and combining them into one grid. Such grids can include widely distributed systems or systems within one data centers. Grid technology has enabled computing resources to be shared globally and easily managed, and the infrastructure becomes incredibly flexible. Nowadays the infrastructure is a pool of virtual resources that the user can call on as needed. The developed environment is offered for free in terms of the CrossGrid License Agreement. It means, that there are no additional costs for the installation packages, and TCO leads only on the used hardware and administrative prerequisites of the middleware – the Roaming Access Server, and related packages. The Roaming Access Server is an underlying layer that mediates between the Migrating Desktop and grid resources. Entire structure of proposed infrastructure bases on the CrossGrid License Agreement and other Open License models. There is no other grid desktop with the support for interactive applications on the market.

SUBJECT DESCRIPTORS CODES

510 PROGRAMMING/INFORMATION SYSTEMS
 121 COMMUNICATION SCIENCES/HUMAN COMPUTER INTERACTIONS
 129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL
 128 COMPUTATIONAL PHYSICS
 130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Migrating Desktop User Manual	The document presents the functionality of every Migrating Desktop component, contains the description of the usage. Visit: http://www.eu-crossgrid.org/user_manuals/CG3.1-v3.0-PSNC-MigratingDesktopUserManual.pdf The content: PRODUCT USAGE - running the product - operating requirements - step-by-step user setup - basic operation - advanced features INTERFACE REFERENCE GUIDE - main desktop - main menu - toolbar buttons - desktop windows - creating grid windows - window icons - window properties dialog - managing hidden windows - file transfer. - job submission - job monitoring TROUBLESHOOTING	Public
Migrating Desktop and Roaming Access Server Developer Manual	The document is the Java and Web Services developer guide for the Migrating Desktop and Roaming Access Server. Visit: http://www.eu-crossgrid.org/developer_manuals/CG3.1-v1.0-PSNC-MD_RASDeveloperManual.pdf The content: IMPLEMENTATION STRUCTURE - product use cases - interactivity based on java plug-in use case - running interactive legacy application use case - product component model - detailed implementation model PRODUCT INTERFACES - migrating desktop - java application program interface - tool plug-in - js plug-in - roaming access server - web services interface - server login web service - file tunnel web service - auxiliary web service - application information web service - virtual directory web service PRODUCT TESTING	Public
Roaming Access Server and Migrating Desktop Installation Guide	This document is intended for the Site Administrator of CrossGrid testbed resources and may also be useful for people that need detailed information about the software release. Visit: http://www.eu-crossgrid.org/installation_guides/CG3.1-v4.1-CYF-MD_RASInstallGuide.pdf The content: ABOUT THE SOFTWARE - software components - roaming access server installation - migrating desktop installation - dependencies INSTALLATION IN THE CROSSGRID TESTBED - rpm lists for lcfg - profile modifications for lcfg - manual post installation steps MANUAL INSTALLATION OF RAS - installation from rpm - installation from source - configuration - running and testing MANUAL INSTALLATION OF MD - installation from rpm - installation from source - configuration - running and testing	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Tick	Details	Tick	Details	
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	Details	
Patent applied for							
Patent granted							

Patent search carried out					
Registered design					
Trademark applications					
Copyrights	✓		http://www.eu-crossgrid.org/CrossGrid_Software_Licence.pdf		
Secret know-how					
Other - please specify:					

- 1) Number of **P**riority (national) applications/patents
 2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors

72 Computer and related activities
 73 Research and development
 80 Education

CURRENT STAGE OF DEVELOPMENT

Current stage of development

Software code

Other:

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)		12
Number of (public or private) entities potentially involved in the implementation of the result:		5
of which: number of SMEs:		2
of which: number of entities in third countries (outside EU):		
Targeted user audience: of reachable people		200
S&T publications (referenced publications only)		
publications addressing general public (e.g. CD-ROMs, WEB sites)		15
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	We are looking for the entrepreneur who can undertake to commercialize the tool. We also expect to find the partner who will participate in funding of the future research and developing the user working environment for accessing the distributed resources.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We offer the know-how and expertise in building advanced user working environment, adding new functionality and improvement on-demand, putting into practice. We are interesting in long term support of the product, including bug fixing and maintenance of the version. We support the hardware and software testbed for testing and evaluating purposes. Set-up, installation and configuration of the environment could be provided by us. The source codes, installation packages are distributed under the open license model: CrossGrid Software License.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

The expectations will be given later.

No.	Title
12	Scheduler - Resource Broker

CONTACT PERSON FOR THIS RESULT

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URL	http://www.uab.es
Specific Result URL	http://www.eu-crossgrid.org

SUMMARY

CrossBroker is a system designed to manage jobs that are submitted to the Grid. CrossBroker includes transparent mechanisms for dynamic resource discovery and selection, task mapping, and scheduling, and job monitoring and steering mechanisms. It supports sequential and parallel applications and its main features are the following: - Support for parallel jobs developed with the MPICH library and compiled with the ch_p4 device. These applications run on a single cluster. - Support for MPI applications developed with the MPICH library and compiled with the G2 device. These applications are able to run on resources from multiple clusters. - Support for computational workflows. Computational workflows are made of separate jobs (sequential or parallel) that exhibit control and data dependencies. - Support for batch and interactive execution. In batch execution, jobs have their standard input and standard output interfaces redirected to files. This execution mode is intended for applications that run off-line. The interactive execution mode provides input/output streaming in near real time and is intended for applications that run on-line with a direct interaction to/from the user. Sequential and MPI applications can use both modes of execution. - Includes a generic API for interfacing the broker to external monitoring/performance tools. The integration of the Grid Monitoring and Data Analysis Tool (GMDAT) has been implemented by using this interface. - Support for job pre-emption. This is a simple time-sharing mechanism that allows execution of interactive applications when no free resources are available. With the pre-emption mechanism these interactive applications are able to run immediately on the same machine where a certain batch application is already running. CrossBroker runs on Grid platforms based on LCG-2 middleware, which currently uses Linux RH7.3 and Globus 2.4.x, and has a specific Job Description Language (JDL) and a Glue Schema for job and resource description, respectively.

SUBJECT DESCRIPTORS CODES

579 SOFTWARE ENGINEERING, MIDDLEWARE, GROUPWARE
510 PROGRAMMING/INFORMATION SYSTEMS
129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL
321 INFORMATION TECHNOLOGY/SCIENCE
318 INFORMATICS

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
CrossBroker User's Manual	Provides instructions for running jobs in a Grid using CrossBroker http://www.eu-crossgrid.org/user_manuels/CG3.2-v1.2-UAB-GridResourceManagementUserManual.pdf	Public
CrossBroker Installation Guide	Contains information for the installation and configuration of CrossBroker components. http://www.eu-crossgrid.org/installation_guides/CG3.2-v2.3-UAB-GridResourceManagementInstallationGuide.pdf	Public
CrossBroker Brochure	http://dissemination.crossgrid.org/modules.php?name=Downloads&d_op=getit&lid=63	Public
Papers and Technical Reports	Other relevant documents are listed here http://aomail.uab.es/caos/ and can be provided on demand.	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Details	Tick	Details	
	Tick	NoP ¹⁾	NoI ²⁾			
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓			✓	Pre-existing know-how exists for some third-party components developed at the Condor, Globus and EDG projects.	
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT**Current stage of development**

Prototype/demonstrator available for testing

Other:**Quantified data about the result**

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	12	12
Number of (public or private) entities potentially involved in the implementation of the result:	2	2
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people	21	100
S&T publications (referenced publications only)	4	8
publications addressing general public (e.g. CD-ROMs, WEB sites)	0	0
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result**COLLABORATIONS SOUGHT**

R&D	Further research or development	✓	FIN	Financial support	✓
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	✓
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	We're looking for interested users, who will use the prototype we have developed in their own environment and are willing to establish some collaboration agreement that includes funding for future research and development. Other collaborations could also be established based on our experience in resource management and advance tools for Grids.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering know-how and expertise in building advanced tools for managing applications in Grid and distributed environments.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Partners involved in Grid deployment or Grid sysadmins.

No.	Title
13	Grid Application Monitoring System GRIMO (OCM-G)

CONTACT PERSON FOR THIS RESULT

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URL	http://wwwbode.in.tum.de
Specific Result URL	http://www.icsr.agh.edu.pl/ocmg

SUMMARY

The OCM-G (OMIS-Compliant Monitoring system for the Grid) is a system for monitoring of parallel applications running on the Grid. The OCM-G provides services for collecting and preprocessing information about applications at run-time. The OCM-G runs as an autonomous infrastructure exposing a standard interface. The OCM-G is designed as a basis for application-development-support tools, such as Performance Analyzers, Debugger or Visualizers. Using the services of the OCM-G, tools are (among others) enabled to obtain performance measurements of the monitored application, related to, for example, delay and volume of communication, CPU usage, etc. Information collected from the OCM-G is typically visualized in the form of graphical charts to show application progress, monitor activities of individual processes, observe communication patterns, detect bottlenecks, etc. Compared to existing systems with a similar purpose, the OCM-G provides some unique capabilities which, among others, are as follows. (1) Support for Grid applications running across multiple sites. (2) High performance: techniques for data rate reduction to ensure extremely low overhead and high responsiveness, enough even for monitoring of interactive applications. (3) Flexibility: rather than a fixed set of metrics, the OCM-G provides an extensive set of low level services; this allows for construction of a variety of performance metrics with desired semantics. (4) Extensibility: the OCM-G can be extended with additional services, loaded dynamically at run-time. (5) Compact and secure design: the OCM-G runs as a set of user processes, which use a lightweight and fast socket-based communication mechanism. At the same time, state-of-the-art techniques are applied to ensure secure communication. No special privileges (special access rights, additional open ports on firewalls, or other potential security holes) are required. (6) Design as an autonomous infrastructure exposing a standard interface OMIS (On-line Monitoring Interface Specification). The services of the OCM-G are available via this interface, which minimizes the effort of porting OMIS-based tools across platforms (basically only the OCM-G needs to be ported). (7) Interoperability: thanks to the design as an autonomous service with a well-defined protocol, the OCM-G supports the interoperability of multiple tools monitoring a single application. The target users of the OCM-G are (1) application developers, and (2) tool developers. The application developers need to use the OCM-G if they also use an OCM-G-compliant tool to monitor an application. However, in this case the usage of the OCM-G is straightforward. The main target user community are tool developers who can use the OCM-G as a basis for various types of application-development-support tools. The main benefits of using the OCM-G for tool developers are as follows: (1) The OCM-G provides an abstraction layer for accessing low-level information about (and performing manipulations on) the target system and applications. Thus, there is no need to develop a tool-specific monitoring layer. Furthermore, portability is greatly increased, since platform-specific issues are hidden in the OCM-G. Consequently, tools automatically support platforms to which the OCM-G is ported. (2) The OCM-G, as a common monitoring infrastructure enables interoperability of multiple tools monitoring a single application. Otherwise (i.e., if each tool is using its own monitoring layer) this is usually impossible, since different monitors are likely to exclude each other (for example because the usage of system debugging mechanisms such as ptrace is exclusive). Those features allow for substantial saving of resources (time and funds) in the process of tool development. Currently the OCM-G is a fully operational grid-enabled system possessing the above-described features. The target applications are currently MPI-based ones, though the core design and implementation of the OCM-G does not in any way depend on the particular type of the application. The OCM-G is a flexible, extendible and powerful system which currently is used as a basis of the G-PM performance analysis tool, and in the future can be used to build various types of tools, not only performance analyzers, but also different types of visualizers, debuggers, load balancers, or other tools. The OCM-G can also easily be integrated as part of a larger infrastructure, for example as part of a generic Grid monitoring and information service. In such a system, the OCM-G could work as one of many systems collecting information about different Grid entities (infrastructure, applications, middleware, etc.)

SUBJECT DESCRIPTORS CODES

130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING
129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
OCM-G User Guide	This document is intended for application developers who would like to monitor their applications using the OCM-G monitoring system and an OCM-G-compliant tool, for example the G-PM performance measurement tool. Download as PDF	Public
OCM-G Installation Guide	This document contains instructions for installation of the OCM-G from source codes or binary packages as well as running and testing the installation. Download as PDF	Public
OCM-G Developer's Guide	This document is intended for tool developers who would like build tools for application development support compliant with the OCM-G and the OMIS specification. Download as PDF	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Details	Current	Foreseen	Details
	Tick	NoP ¹⁾	NoI ²⁾	Tick	NoP ¹⁾	NoI ²⁾
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓					Use of this product is subject to the terms and licenses stated in the GNU General Public License agreement.

Secret know-how						
Other - please specify:						

- 1) Number of **P**riority (national) applications/patents
 2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	12	12
Number of (public or private) entities potentially involved in the implementation of the result:	3	5
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people		
S&T publications (referenced publications only)	5	5
publications addressing general public (e.g. CD-ROMs, WEB sites)	2	2
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	✓
LIC	Licence agreement	✓	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement	✓	INFO	Information exchange/training	✓
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering a universal, powerful and generic system for on-line monitoring of grid applications. This system can be used as a basis for various types of tools or integrated in larger systems as an information source on running applications. We are also offering an expertise in the field of application monitoring.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

(1) Independent software vendor in the area of tools for (parallel) programming on the Grid. Options: use OCM-G as a basis for own tool developments; marketing of OCM-G and provision of services based on OCM-G, possibly together with the G-PM tool developed in CrossGrid, too. (2) Companies and/or research institutes working in the field of (parallel) programming on the Grid, which are interested in research collaborations on the use and/or further development of OCM-G.

No.	Title
14	Santa-G - Grid Monitoring Tool

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	http://www.eu-crossgrid.org

SUMMARY

The SANTA-G NetTracer is a demonstrator of the SANTA-G framework. SANTA-G is a generic framework that was developed to support information sources that generate a large amount of data at a very fast rate in a form unsuitable for direct insertion to a Grid monitoring system. It does this by allowing direct access to the data through the Grid information system. The NetTracer demonstrates this by allowing users to access log files stored in libcap (a network packet capture library) format through the EU DataGrid's (EDG) Relational Grid Monitoring Architecture (R-GMA) monitoring and information system. Examples of tools that generate logs in this format are Tcpdump, and Snort (a network intrusion detection system). It is aimed at system administrators for network traffic analysis across multiple sites within a Grid, and also for performance analysis. It is also intended to use the SNORT functionality of the NetTracer to construct a Grid-wide intrusion detection system. The added benefit of this tool is that it illustrates to those that wish to employ ad-hoc non-invasive monitoring how they can now construct it using this generic grid-enabled framework, e.g. grid sysadmins wishing to monitor the security of sites within the grid infrastructure.

SUBJECT DESCRIPTORS CODES

129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL
 321 INFORMATION TECHNOLOGY/SCIENCE
 510 PROGRAMMING/INFORMATION SYSTEMS
 579 SOFTWARE ENGINEERING, MIDDLEWARE, GROUPWARE

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
SANTA-G NetTracer User Manual	Provides instructions for configuration and usage of NetTracer components. It can be downloaded as a pdf .	Public
SANTA-G NetTracer Installation Guide	Contains instruction for the installation and configuration of the NetTracer components. It can be downloaded as a pdf .	Public
SANTA-G NetTracer Developer Guide	Contains information for a developer of the NetTracer system, including the code structure of all components and implementation details. It can be downloaded as a pdf .	Public
SANTA-G NetTracer Brochure	The brochure can be obtained here .	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current	Foreseen	Details	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Tick	Details
Patent applied for					
Patent granted					
Patent search carried out					
Registered design					
Trademark applications					
Copyrights	√				Use of this product is subject to the terms and licenses stated in the CrossGrid License Agreement.
Secret know-how					
Other - please specify:					

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

72 Computer and related activities
 73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
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Time to application / market (in months from the end of the research project)	24	24
Number of (public or private) entities potentially involved in the implementation of the result:	1	1
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people	200	200
S&T publications (referenced publications only)	3	3
publications addressing general public (e.g. CD-ROMs, WEB sites)	0	0
publications addressing decision takers / public authorities / etc.	0	0
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result
COLLABORATIONS SOUGHT

R&D	Further research or development	√	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Technical knowhow

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Grid sysadmins and security specialists

No.	Title
15	JIMS - JMX-based Infrastructure Monitoring System.

CONTACT PERSON FOR THIS RESULT

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URL	www.agh.edu.pl
Specific Result URL	

SUMMARY

Current status of JIMS - the JMX-based Infrastructure Monitoring System is as follows. JIMS is a result of three years of development during the CrossGrid project. Its current version 1.5.32 is available as an open source project under CrossGrid Licence, for use with Linux and Unix systems. Last validated version 1.5.23 is installed in CrossGrid production and development testbed. It uses Java Management Extensions what makes it platform independent grid monitoring tool with interoperable Web Service API (Application Programming Interface) and Java command line clients. JIMS is assigned rather to other middleware tools making use of monitoring parameters, including resource brokers, benchmarks or performance predictions mechanisms. Its command line client applications can be used also by network and grid middleware administrators, to investigate the infrastructure configuration and resource usage. There are some barriers resulting from chosen Java technology, concerning memory usage, which makes it better suited for systems with large physical memory for Java Virtual Machine in which the JIMS is running.

SUBJECT DESCRIPTORS CODES

129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL
130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
http://savannah.fzk.de/websites/crossgrid/cg-wp3-3/wp3_3_3-jims/docs/jims-1.5.32-installguide.pdf	JIMS installation guide	Public
http://savannah.fzk.de/websites/crossgrid/cg-wp3-3/wp3_3_3-jims/docs/jims-1.5.32-developermanual.pdf	JIMS developer guide	Public
http://savannah.fzk.de/websites/crossgrid/cg-wp3-3/wp3_3_3-jims/docs/jims-1.5.32-usermanual.pdf	JIMS user manual	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate				Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current			Foreseen	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick	
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓			CrossGrid licence	✓	Included within the software packages
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Prototype/demonstrator available for testing
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	12	12
Number of (public or private) entities potentially involved in the implementation of the result:	2	3
of which: number of SMEs:	1	1
of which: number of entities in third countries (outside EU):	1	1
Targeted user audience: of reachable people	100	200
S&T publications (referenced publications only)	7	8

publications addressing general public (e.g. CD-ROMs, WEB sites)	5	3
publications addressing decision takers / public authorities / etc.	2	2
Visibility for the general public	NO	

Further collaboration, dissemination and use of the result
COLLABORATIONS SOUGHT

R&D	Further research or development	√	FIN	Financial support	√
LIC	Licence agreement	√	VC	Venture capital/spin-off funding	√
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	I'm looking for a partner interested in development of Java oriented tools for distributed systems monitoring and management.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Interest of sensor applications for delivery platform specific monitoring data for UNIX and LINUX systems. Also looking for database to store historical data. Can offer detailed information about infrastructure and network in interoperable way using Java and Web Services.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Expected input: research and development to improve some aspects of the system: performance, security, etc.

No.	Title
16	Optimization of Data Access

CONTACT PERSON FOR THIS RESULT

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URL	http://www.cyf-kr.edu.pl/
Specific Result URL	

SUMMARY

Unified Data Access Layer (UDAL) developed by task 3.4 CrossGrid project, provides a flexible architecture for storage nodes and data centers. UDAL allows for a very flexible optimization and control of the internal way of data accessing even if it is stored in heterogeneous devices. It is fully adaptable for future purposes, but currently is used only for organizing the estimation of data access latency and bandwidth of internal storage nodes. However, it is important to notice that the provided solution could be also directly used for other purposes. The current version of UDAL is distributed together with a set of specialized components for data access cost estimation for data stored in secondary and tertiary storage. The implemented during the CrossGrid project life Unified Data Access Layer (UDAL) is supposed to simplify access to the grid storage and make it simpler and more efficient as well as to cover grid storage heterogeneity. This tool is a framework containing plugins, which are automatically selected by built-in expert system in order to be best matched to the current context. Those plugins called cecomponents are divided into categories (specializations) which are responsible for different services offered by UDAL. For instance together with UDAL release a set of cecomponents for data access estimations to different storage devices is enclosed. The UDAL release bundle contains cecomponents for data access cost estimation to secondary storages like HDDs, disk arrays, san disk as well as cecomponents estimating access cost to data stored in tertiary storages (HSM) like DiskXtenter (former UniTree), Castor. Since, UDAL is a universal platform then it might be use for different purpose. For example, it might be used as a tool for contextual service selection in grid environment. One application of the achieved technology in that filed is planned for K-WF Grid project. There are available cecomponents unifying data access to different data storages providing a universal API. The programming interface hides heterogeneity of real storage devices installed in data centers. At the moment cecomponents are available for accessing data in secondary storages as well as specialized ones for DiskXtenter available trough FTP and Castor available trough RFIO. The UDAL platform is fully expandable for future purposes. Simply writing new cecomponents or modification of built-in expert system rules can make the tool applicable for entire different purposes as well as it can be adopted or tuned to new data storing and service devices. The release bundle contains sample cecomponents which might be used as templates for development of third-party ones. What is very important from development of new cecomponents point of view is that cecomponents can be developed in almost any programming language even whole bunch of well known script programming tools. One of the most important benefits using that complex solution, which includes even expert system approach, is ability of UDAL adaptation for future different storage devices even if they were not taken into account during the development process of this tool. Simply future users can easily built they own cecomponents – plugins – then describe their specialization and in the end register using UDAL tools. Thanks to built-in expert system the new plugins will be used instantly after their registration if the execution context will require that. So, in other words, UDAL can use new plugins instantly after their registration. UDAL is supposed to be exploited by enterprise data storage centers where cost of access to data must be predicted ahead, as well as heterogeneity of device layer makes the infrastructure difficult in usage. Thanks to very open and flexibly architecture, UDAL can be easily applied to any storage center, as well as it can be easily expanded for new features by its users.

SUBJECT DESCRIPTORS CODES

150 DATABASES, DATABASE MANAGEMENT, DATA MINING
278 GRID CONNECTION

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Technical Brochure	http://dissemination.crossgrid.org/modules.php?name=Downloads&d_op=getit&lid=59	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate		
	Current	Foreseen	Tick	Tick	Details	
	Tick	NoP ¹⁾	NoI ²⁾	Tick	Details	
Patent applied for						
Patent granted						
Patent search carried out						
Registered design						
Trademark applications						
Copyrights	✓				Product license: http://www.eu-crossgrid.org/CrossGrid_Software_Licence.pdf	
Secret know-how						
Other - please specify:						

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	0	36
Number of (public or private) entities potentially involved in the implementation of the result:	2	2
of which: number of SMEs:	0	0
of which: number of entities in third countries (outside EU):	0	0
Targeted user audience: of reachable people		
S&T publications (referenced publications only)	6	6
publications addressing general public (e.g. CD-ROMs, WEB sites)	2	2
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result**COLLABORATIONS SOUGHT**

R&D	Further research or development	√	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	√
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering a powerful, extendible tool for unification of data access in grid environment. The tool can be flexibly adapted to particular requirements of users' applications. The tool can be used by the application developers community as well as by the end users of applications. We are offering expertise in data access unification including vast experience in data access cost estimation for grid environments.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

1. Companies /research institutes who are interested in further development of UDAL 2. A partner with expertise in commercializing software and software licensing is also needed. 3. A partner experienced in standardization some approaches. In this case the innovative architecture used for UDAL construction can be used for many purposes.

No.	Title
17	International Grid Computing Infrastructure (testbeds)

CONTACT PERSON FOR THIS RESULT

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URL	http://www.ifca.unican.es
Specific Result URL	http://grid.ifca.unican.es

SUMMARY

The international testbed is a key component of the CrossGrid Project, as it provides the framework to run the applications in a realistic GRID environment. In particular, organisational issues and performance and security aspects, including amongst others the network support, were only be evaluated thanks to the help of the testbed, that relying on a high-performance network (GEANT), assured the participation of an adequate number of computing and data resources distributed across Europe. The CrossGrid testbed has * provided a distributed resource facility where the different WP developments have been tested on a Grid framework, * supported the construction of sites across Europe, integrating national facilities provided by the involved partners into the CrossGrid framework * monitored the network support required in the testbed set-up, and established the required links with the corresponding network providers, * integrated the basic middleware software developed or required in the different WP tasks * assured the required level of interoperability with other Grid testbeds, firstly with the DataGrid testbed, later with LCG and EGEE * coordinated in practice the software releases that should provide the appropriate documentation and support for the installation across the distributed sites. In particular, it has assured that GRID applications from WP1 had run in the corresponding setup. CrossGrid testbed sites were placed in 16 different institutions distributed across 9 different European countries, expanding the Grid community to these countries.

SUBJECT DESCRIPTORS CODES

128 COMPUTATIONAL PHYSICS
138 COOPERATIVE WORKING
150 DATABASES, DATABASE MANAGEMENT, DATA MINING
278 GRID CONNECTION
321 INFORMATION TECHNOLOGY/SCIENCE
510 PROGRAMMING/INFORMATION SYSTEMS

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
CrossGrid software repository http://gridportal.fzk.de	All software developed is available in this repository	Public
Testbed Introduction for users http://grid.ifca.unican.es/crossgrid/wp4/instructions.htm	All testbed instructions and tutorial	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate			
	Tick	NoP ¹⁾	NoI ²⁾	Current Details	Foreseen Tick	Tick	Details
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights							
Secret know-how							
Other - please specify:	✓			CrossGrid is open source under CG license		✓	Globus, VDT, EDG, LCG components

1) Number of Priority (national) applications/patents

2) Number of Internationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Scientific and/or Technical knowledge (Basic research)
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)	0	0
Number of (public or private) entities potentially involved in the implementation of the result:	16	100

of which: number of SMEs:	0	10
of which: number of entities in third countries (outside EU):	0	5
Targeted user audience: of reachable people	100	20000
S&T publications (referenced publications only)	5	5
publications addressing general public (e.g. CD-ROMs, WEB sites)	3	3
publications addressing decision takers / public authorities / etc.	0	0
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	✓	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	✓
JV	Establish a joint enterprise or partnership	✓	CONS	Available for consultancy	✓
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

The CrossGrid testbed has been open to any interested potential user, and will be kept available until the end of December 2005

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

We welcome any interested partner

No.	Title
18	Grid Visualization Kernel

CONTACT PERSON FOR THIS RESULT

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E-mail	kranzmueller@gup.jku.at
URL	http://www.gup.uni-linz.ac.at
Specific Result URL	http://www.gup.uni-linz.ac.at/crossgrid

SUMMARY

GVK offers efficient and flexible transportation mechanisms for visualization purposes, while using standard interfaces for connecting to scientific applications and output devices. With the available interfaces of GVK, grid-enabled applications may use traditional visualization toolkits as well as sophisticated virtual reality devices to present the results to the scientific user.

SUBJECT DESCRIPTORS CODES

130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING
129 COMPUTER SCIENCE/ENGINEERING, NUMERICAL ANALYSIS, SYSTEMS, CONTROL

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
CrossGrid User Manual - Biomedical Application	Describes the functionality of GVK within the CrossGrid Biomedical Application http://www.eu-crossgrid.org/user_manuals/CG1.1-v1.0-UvA007-BiomedicalAppUserManual.pdf	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate			Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate			
	Tick	NoP ¹⁾	NoI ²⁾	Current Details	Foreseen Tick	Tick	Details
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights	✓			Use of this project is subject to the terms and licences stated in the CrossGrid license			
Secret know-how							
Other - please specify:							

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS**Market application sectors**

72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Software code
Other:	

Quantified data about the result

Items (about the results)	Actual current quantity	Estimated (or future) quantity
Time to application / market (in months from the end of the research project)		12
Number of (public or private) entities potentially involved in the implementation of the result:		1
of which: number of SMEs:		0
of which: number of entities in third countries (outside EU):		0
Targeted user audience: of reachable people		
S&T publications (referenced publications only)	14	17
publications addressing general public (e.g. CD-ROMs, WEB sites)	4	
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	√	FIN	Financial support	
LIC	Licence agreement		VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	√
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:	We will continue to develop and use as well as support our products from CrossGrid within the scope of the Austrian grid project and possibly other follow-up projects.				

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

The solution offers the possibility for extending it in various directions within the grid visualization domain since it is based on VTK, which offers flexibility regarding the visualization algorithms used. The extension of the system appears especially sensible for other flow visualization applications.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Additional partners, who can benefit from our project results include research institutions as well as companies interested in visualization in grid environments. The visualization is now focused on the medical domain but can be extended towards other domains where flow visualization is required.

No.	Title
19	High Level Architecture Support

CONTACT PERSON FOR THIS RESULT

Name	Katarzyna Rycerz
Position	assistance
Organisation	ICS AGH & CYFRONET AGH
Address	al. Mickiewicza 30 30-059, Cracow Poland
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URL	http://www.agh.edu.pl
Specific Result URL	

SUMMARY

The product supports execution of HLA distributed interactive simulations in the Grid environment. The architecture is based on the Open Grid Services Architecture (OGSA) concept that allows for modularity and compatibility with Grid Services already developed. As HLA is explicitly designed as a support for interactive distributed simulations, it provides various services needed for that specific purpose, such as time management useful for time-driven or event-driven interactive simulations. It also takes care of data distribution management and allows all application components to see the entire application data space in an efficient way. On the other hand, the HLA standard does not provide automatic setup of HLA distributed applications and there is no mechanism for migrating federates according to the dynamic changes of host loads or failures, which is essential for Grid applications. Our solution introduces HLA functionality to the Grid Services framework extended by specialized high-level Grid Services. This allows for execution control through Grid Service interfaces; the internal control and data of distributed interactive simulations flows through HLA. The design also supports migration of federates (components) of HLA applications according to environmental conditions. The possible end users are simulation developers, developers of defence applications as well as people from game industry. Benefits from using the system are clear- the applications can take advantage from Grid without losing efficiency.

SUBJECT DESCRIPTORS CODES

130 COMPUTER TECHNOLOGY/GRAPHICS, META COMPUTING
565 SIMULATION, SIMULATION ENGINEERING

DOCUMENTATION AND INFORMATION ON THE RESULT

Documentation type	Details (Title, ref. number, general description, language)	Status: PU=Public CO=Confidential
Rycerz, K., Bubak, M., Malawski, M., and Sloat, P.: A Framework for HLA--based Interactive Simulations on the Grid in: Simulation Special Issue: Applications of Parallel and Distributed Simulation in Industry. 2005, 81: 67-76	This article presents the design and feasibility of a system that supports execution of High Level Architecture (HLA)-distributed interactive simulations in an unreliable Grid environment. The article presents an overall architecture of a system based on experience gained from previous designs. The most important operational components of the system are presented, and actual performance issues are discussed. The design of the architecture is based on the Open Grid Services Architecture (OGSA) concept that allows for modularity and compatibility with Grid services already being developed. The issue of migration to the recently proposed Web Services Resource Framework (WSRF) is discussed as well.	Public

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	KNOWLEDGE: Tick a box and give the corresponding details(reference numbers, etc) if appropriate					Pre-existing know-how Tick a box and give the corresponding details(reference numbers, etc) if appropriate	
	Current				Foreseen	Tick	Details
	Tick	NoP ¹⁾	NoI ²⁾	Details	Tick		
Patent applied for							
Patent granted							
Patent search carried out							
Registered design							
Trademark applications							
Copyrights	✓			Use of this product is subject to the terms and licenses stated in the GNU General Public License agreement			
Secret know-how							
Other - please specify:							

1) Number of **P**riority (national) applications/patents

2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Market application sectors
72 Computer and related activities
73 Research and development

CURRENT STAGE OF DEVELOPMENT

Current stage of development	Experimental development stage (laboratory prototype)
Other:	

Quantified data about the result

Items (about the results)	Actual current	Estimated (or
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	quantity	future) quantity
Time to application / market (in months from the end of the research project)	12	12
Number of (public or private) entities potentially involved in the implementation of the result:	2	2
of which: number of SMEs:		
of which: number of entities in third countries (outside EU):		
Targeted user audience: of reachable people		
S&T publications (referenced publications only)	5	5
publications addressing general public (e.g. CD-ROMs, WEB sites)	1	1
publications addressing decision takers / public authorities / etc.		
Visibility for the general public	YES	

Further collaboration, dissemination and use of the result

COLLABORATIONS SOUGHT

R&D	Further research or development	√	FIN	Financial support	
LIC	Licence agreement	√	VC	Venture capital/spin-off funding	
MAN	Manufacturing agreement		PPP	Private-public partnership	
MKT	Marketing agreement		INFO	Information exchange/training	√
JV	Establish a joint enterprise or partnership		CONS	Available for consultancy	
Other	(please specify)				
Details:					

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

We are offering a universal and powerful system for managing HLA-based simulations on the Grid. This system can be used as a support for running distributed interactive applications that need to use Grid resources.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Companies and/or research institutes working in the field of distributed simulations on the Grid, which are interested in research collaborations on the use and/or further development of Grid HLA Management System. Gaming and defence industry are good candidates for our partners.

Exploitation plans

CONFIDENTIAL

I am the Co-ordinator of the above project, and confirm on behalf of the contracted Partners the information contained in this Technological Implementation Plan, and I authorise its public dissemination.

Signature:

Name:

Date:

Organisation:

close